

4.17 ENERGY RESOURCES AND GREENHOUSE GAS EMISSIONS

4.17.1 Introduction to Analysis

This section assesses the energy consumption, measured in British Thermal Units (BTUs), of the DNA project in 2027. The RT system consists of passenger automobiles, trucks, buses, and existing light rail facilities. This section evaluates the energy used to operate the RT system as part of the DNA project. Additionally, an estimate of the amount of energy to construct the system is included. The energy calculations are based on the regional travel demand model projections prepared by SACOG and transit ridership projections modeled by RT for this project.

4.17.2 Environmental Setting

Energy sources for transportation are most commonly petroleum fuels for automobiles and trucks, and electricity for light rail systems. Currently, 100 percent of RT buses run on compressed natural gas. RT negotiates a fixed-price procurement services agreement through the State of California to supply fuel. Buses are fueled at RT's pumping stations (RT, 2002).

The electricity for RT's light rail system is purchased through the Sacramento Municipal Utilities District (SMUD). SMUD produces approximately 50 percent of its own power and purchases the other 50 percent through long- and short-term contracts with other energy companies. SMUD-owned power generation is comprised primarily of fossil fuel generation plants, followed by hydroelectric power plants (SMUD, 2002). However, when evaluating the total energy types, including energy purchased, power is produced primarily from hydroelectric renewable energy sources (SMUD, 2000). Table 4.17-1 illustrates power resources used in a normal year.

Power Supply	Percent
Eligible Renewables*	10
Coal	4
Hydroelectricity	34
Turbines / Fuel Cells	47
Nuclear	4
Other	1
Source: SMUD, 2002.	
Note:	
* Eligible renewables are biomass and waste, geothermal, small hydroelectric, solar, and wind power. Biomass and geothermal make up the majority of this energy resource, on average.	

In 2000, California endured several rotating electrical power outages and sharp increases in energy costs due to a volatile wholesale market. The impacts of the energy shortage led to increased interest in planning energy resources and becoming more energy conscious. This

analysis reveals the total energy consumed for transportation services in the Sacramento Region for the DNA project to determine whether the project will result in a net increase or decrease in energy use as a result of the proposed transit investment.

4.17.3 Impact Evaluation

4.17.3.1 Methodology

Energy is consumed for both the construction and operation of major transportation projects. This section evaluates the energy consumption of the DNA project based on traffic and ridership projections for the year 2027. The energy calculations are based on the Sacramento region weekday vehicle miles traveled (VMT), the projected train car miles traveled, and the total bus miles traveled (bus VMT).

The regional VMT was separated into passenger miles and heavy-truck miles to account for differences in energy consumption levels. Passenger vehicles were assumed to be 96 percent with heavy trucks accounting for the remaining 4 percent of the total regional VMT. All energy consumed was converted to BTUs to provide a common measure between all energy sources.

The BTUs for each category of VMT are cited from the *Transportation Energy Data Book, Edition 16* (Oak Ridge National Laboratory, 1996) as follows:

- One passenger vehicle mile = 6,233 BTUs
- One heavy-duty vehicle (trucks) = 22,046 BTUs
- One bus (natural gas) mile = 41,655 BTUs
- One light rail train car electric mile = 77,739 BTUs

Significance Criteria

Implementation of the DNA project would have a significant impact on energy resources if it:

- Results in an increase of total local energy consumption for transportation purposes; or
- Results in increasing greenhouse gases.

DNA Project Impacts

This section quantifies energy consumption for the RT system as part of the DNA project. Table 4.17-2 summarizes the VMT for light rail, autos and trucks, and buses for the Sacramento Region for the DNA project compared to future conditions without the DNA project. Table 4.17-3 presents the estimated daily energy consumption for the DNA project compared to future conditions without the DNA project.

As shown in Table 4.17-2, auto and truck VMT is expected to decrease compared to future conditions without the project (Impact ENG-1). In addition, the total Sacramento Region energy consumption in 2027 is expected to be 511,314,129 thousand BTUs with implementation of the DNA project, which is slightly lower than future conditions without the project (Impact ENG-2). This results in a slightly beneficial but less-than-significant impact to energy use and greenhouse gas generation.

Additionally, the DNA project will require energy for construction over an estimated 3-year schedule. Energy used for construction activities is generally in the form of fossil fuels for construction equipment. In general, there is a positive correlation between the cost of a project and the energy required for construction. As shown in Table 4.17-4, the DNA project would consume about 708,500 million BTUs, which would be a less-than-significant impact (Impact ENG-3).

Mitigation Measures

The difference in energy consumption between the alternatives is too small to serve as a reliable discriminator. Therefore, no mitigation is required.

Table 4.17-2 Vehicle Miles Traveled per Day per Mode for the Sacramento Region (2027)			
Scenario	Light Rail VMT	Auto and Truck VMT	Bus VMT
Future No-Project	7,015	74,037,936	65,724
DNA Project	8,652	73,980,971	65,387

Sources: SACOG, 2006a. Oak Ridge National Laboratory, 1996.
Notes:
Revenue train hours and bus miles are based on output from the Travel Demand Model and adjusted for validation.
BTU/vehicle mile are based on *Transportation Energy Data Book, Edition 16* as provided in 5309 New Starts Criteria, July 2001.

Table 4.17-3 Energy Consumed for the DNA Project (2027)						
Scenario	BTUs Consumed by Light Rail (thousands)	BTUs Consumed by Autos and Trucks (thousands)	BTUs Consumed by Buses (thousands)	Total BTUs (thousand)	Difference in BTUs (thousands)	Percent Change in Energy use
Future No-Project	545,339	508,308,930	2,737,733	511,592,002	N/A	N/A
DNA Project	672,597	507,917,836	2,723,695	511,314,129	(277,873)	(0.05)

Table 4.17-4 Energy Consumed for the Construction of the DNA Project			
Component	Miles of Single Track	BTUs per Mile of Single Track (millions)	Total BTUs (millions)
At-Grade Track	21.4	12,290	263,006
Elevated Track	4.2	55,460	232,932
Systems	N/A	N/A	212,562
Total Energy			708,500

Notes:
The alignment includes 12.8 miles of double track (25.6 miles of single track).
The energy estimate assumes that 70 percent of the project energy consumption would be for guideway construction, with the remaining 30 percent for systems.